REMARKS

In light of the following remarks, reconsideration of the present application is requested. Claims 1, 3, 5-36, and 39-43 are pending in the application. Claims 1, 33, and 41 are independent claims. Claims 1, 3, 5-36, and 39-43 are amended. Claims 2, 4, 37, 38, and 44-46 are canceled. No new matter has been added.

Information Disclosure Statement

Applicant appreciates for Examiner's consideration of the Information Disclosure Statement filed on January 28, 2005 and March 16, 2007.

Priority

Applicant appreciates the Examiner's acknowledgement of Applicants' claim for foreign priority and the indication that the certified copy of the priority document has been received.

Claim Objections

Claim 31 is objected to because of informalities, i.e., the phrase "...wherein the or each pump..." needs to be clarified.

The Applicants have amended claim 31 to recite "...wherein each pump..." rather than "...wherein the or each pump..." Accordingly, the Applicants submit the objection to claim 31 is moot. In light of the amendment to claim 31, the Applicants respectfully request the objection to claim 31 be withdrawn.

Claim Rejections - 35 USC §112

Claim 35 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner rejected claim 35 under 35 U.S.C. § 112 for being dependent upon itself. The Applicants thank the Examiner for pointing out this error and have accordingly amended claim 35 to depend from claim 33. In light of the amendment to claim 35, the Applicants respectfully request the rejection of claim 35 under 35 U.S.C. § 112 be withdrawn.

Claim Rejections - 35 USC §102

Claims 1-3, 6-9, 33, 34, and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Caillaud (U.S. Patent No. 2,971,465 A). The Applicants respectfully traverse.

Caillaud discloses two embodiments of a diaphragm pump. The first embodiment is illustrated in FIGS. 1-4 and the second embodiment is illustrated in FIGS. 5 and 6. The Applicants submit the first embodiment fails to anticipate claim 1 at least because the first embodiment does not disclose a "...tube structure being maintained in a taut condition between the ends thereof..." The Applicants further submit the second embodiment fails to anticipate claim 1 at least because the second embodiment does not disclose "wherein one end of the tube structure ***is closed*** and the other end is connected to a port through which pumped fluid can enter into and discharge from the pumping chamber."

Caillaud's first diaphragm pump includes a diaphragm 2. As shown in FIGS. 1-4, diaphragm 2 is supported on one end by an outer flange 7 that is sandwiched between one end 8 of the pump body and an annular flange 9 of the pipe 11 (see FIG. 1 below). The other end of the diaphragm 2, however, is unsupported. Because Caillaud's diaphragm 2 is supported on one end only, the Applicants submit this embodiment does not disclose a diaphragm maintained in a taut condition. Stated

another way, this embodiment does not disclose a "...tube structure being maintained in a taut condition between the ends thereof...," as recited in claim 1. For at least this reason the Applicants submit Caillaud's first embodiment does not anticipate claim 1.

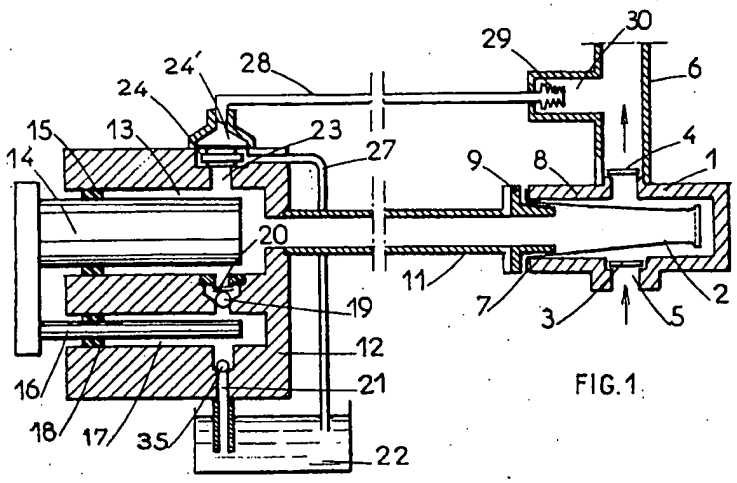

FIG.1

Regarding Caillaud's second embodiment, FIGS. 5 and 6 illustrate a diaphragm pump with a tubular diaphragm 43 open at two ends (see FIG. 5 below). The first end connects to the delivery pipe 42 and the second end connects to the admission pipe 41. However, claim 1 recites "wherein one end of the tube structure is ***closed*** and the other end is connected to a port through which pumped fluid can enter into and discharge from the pumping chamber." Accordingly, this embodiment of Caillaud's diaphragm pump does not anticipate claim 1 because this embodiment does not disclose a tube structure with a closed end. For at least this reason the Applicants submit Caillaud's second embodiment does not anticipate claim 1.

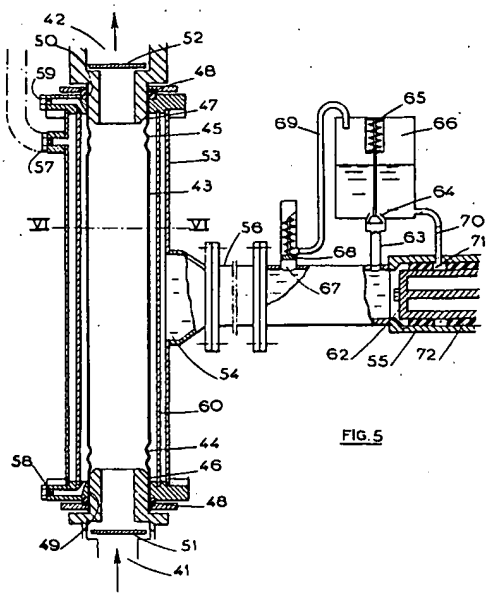

FIG. 5

In addition to the above arguments, the Applicants submit the Examiner's reliance on Caillaud's FIGS. 1-4 and column 8, lines 24-30 to anticipate claim 1 is erroneous. In particular, column 8, lines 24-30 state:

> In this case of the embodiment illustrated in FIGS. 1 to 5, it has been assumed that the driving liquid was contained inside the pocket-shaped diaphragm while the liquid to be conveyed is carried outside the latter. It is obviously possible to provide the driving liquid on the outside of the diaphragm and the liquid to be conveyed inside the latter.

The Applicants submit Caillaud's "liquid to be conveyed" is equivalent to the "pumped fluid" recited in claim 1 and that Cailland's "driving liquid" is equivalent to the "actuating fluid" recited in claim 1. The Applicants note that Cailland's "pumped fluid" enters and exits the interior of the tube structure while the actuating fluid flows in a space between the tube structure and a rigid outer casing. The Applicants submit that reversing the driving liquid and the actuating liquid is not possible with the structure shown in FIGS. 1 and 2. Caillaud's disclosure does not describe a pump that can be reduced to practice because the liquid that is contained inside the pocket

shaped diaphragm 2 flows in a closed fluid circuit. In particular, Caillaud states, in column 4, lines 3-10:

> The chamber 13 inside the piston pump body, the pipe 11 and the diaphragm 2 are filled with a suitable liquid to be described hereinafter and it will be readily ascertained that any movement of the piston has for its result a delivery or an extraction out of said diaphragm of an amount of liquid corresponding to the operative modification in volume of the chamber 13 of the pump body.

Accordingly, this liquid cannot be conveyed outside the closed circuit and thus cannot be pumped in a manner described in the present claims. In other words, the liquid contained within the chambers 13, the pipe 11, and diagraph 2 does not flow outside of these components. The fluid that enters and leaves the diaphragm 2 must always be the "driving liquid" and the fluid flowing through the pump 1 must always be the "liquid to be conveyed."

In addition to the above arguments, the Applicants submit Caillaud does not anticipate claim 1 at least because Caillaud fails to disclose "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure." As discussed above, Caillauds first embodiment discloses diaphragm 2 which is supported on one end by an outer flange 7 that is sandwiched between one end 8 of the pump body and an annular flange 9 of the pipe 11. This cantilever configuration does not provide the diaphragm with a "movable support," accordingly, this embodiment fails to disclose "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1. Likewise, Caillaud's second embodiment discloses a tubular diaphragm 43 with fixed ends which do not support the tubular diaphragm in a movable manner. Therefore, the second embodiment likewise fails to disclose "the tube structure is

movably supported to accommodate longitudinal extension and contraction of the tube structure."

For at least the reasons given above, the Applicants respectfully request the rejection of claim 1, and all claims which depend thereon, under 35 U.S.C. § 102(b) as being anticipated by Caillaud be withdrawn.

For somewhat similar reasons, the Applicants respectfully request the rejection of claim 33, and all claims which depend thereon, under 35 U.S.C. § 102(b) as being anticipated by Caillaud be withdrawn.

Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Taga (U.S. Patent No. 5,964,580 A). The Applicants respectfully traverse.

The Applicants submit Taga does not anticipate claim 1 at least because Taga does not disclose a "...tube structure being maintained in a taut condition between the ends thereof..."

Taga discloses a positive displacement pump with a hollow member 1 that includes a circumferential wall 1a and endplates 20 and 22 (see FIGS. 2 and 5). The end plate 22 is coupled to a tube 11 via a slide pin arrangement as shown in FIG. 5. When hollow member 1 collapses (by action of hydraulic pressure within the casing 2), the end plate 22 slides to the left on the pin as shown by the broken lines in FIG. 5. Because the end plate 22 is free to slide along the pin, there is no force restraining this movement to hold member 1 in a taut condition. Accordingly, the Applicants submit Taga fails to disclose a "...tube structure being maintained in a taut condition between the ends thereof..." For at least this reason, the Applicants submit Taga fails to anticipate claim 1.

In addition, the Applicants submit Taga also fails to anticipate claim 1 because Taga does not disclose "the tube structure being flexible and substantially inelastic," as recited in claim 1. The Examiner relies on column 1, lines 32-34 to anticipate this feature, however, this portion of Taga's disclosure discusses the prior art, not Taga's embodiments. To the contrary, Taga makes numerous references indicating that the hollow member is elastic. For example, column 2, lines 14-15 states: "According to the invention, there is provided a pump comprising a hollow member made of an elastomer..." Further, column 3, lines 58-60 states: "reference numeral 1 denotes a cylindrical hollow member made of an elastic polymeric resin..." Accordingly, the Applicants submit Taga fails to disclose a pump with a "tube structure being flexible and substantially inelastic," as recited in claim 1. For at least this reason, the Applicants respectfully submit Taga fails to anticipate claim 1.

Additionally, the Applicants submit Taga fails to disclose "...the pumping chamber being configured to receive pumped fluid to cause the tube structure to move towards the expanded condition...," as recited in claim 1. Taga's pump includes a hollow member 1 for holding water and a pressurizing means 3 to introduce and remove hydraulic fluid from the casing 2. Water in the hollow member 1 exits the hollow member 1 when the hollow member 1 decreases in volume due to the introduction of hydraulic fluid into the casing 2. However, as explained in column 5, lines 51-64, after the water is exits the hollow member 1, "the pressurizing means 3 evacuates the hydraulic fluid from the casing 2 and ***decreases the interior pressure of the casing. Thus, the hollow member 1 is allowed to restore its original cylindrical shape***, while introducing an additional amount of subject liquid from the inlet 9 through a suction tube."

In light of the above discussion, the Applicants submit the mechanics of the Taga's pump is different from that recited in claim 1. For example, whereas claim 1 recites "...the pumping chamber being configured to receive pumped fluid ***to cause the tube structure to move towards the expanded condition***...," Taga's hollow member 1 moves to its expanded condition as a result of evacuating the hydraulic fluid from the casing, not from the introduction of pumped fluid. Stated another way, Taga's pumped fluid does not cause Taga's tube hollow member to move towards the expanded condition, rather, it is the result of a vacuum caused by removing the hydraulic fluid in the casing.

For at least the reasons given above, the Applicants respectfully request the rejection of claim 1, and all claims which depend thereon, under 35 U.S.C. § 102(b) as being anticipated by Taga be withdrawn.

With respect to claim 5, the Applicants submit the Examiner erred by alleging Taga's pump discloses "wherein the closed end of the tube structure is movably supported in any appropriate fashion such as by way of a spring mechanism." The Examiner, on page 9 of the Office Action, alleges that Taga's arms (4b) and (4c) provide a cantilever spring force by spring action, providing additional support to the closed end. The Applicants submit that arms 4b and 4c do not support the closed end 22 of the hollow member 1. Rather, the arms 4b and 4c contact a mid-section of the hollow member 1 to facilitate depression of the hollow member 1. It is abundantly clear from FIG. 5 that arms 4b and the projections 4c play no part in supporting the closed end 22, support being provided by a pin inserted into a boss. The function of the arms 4b and the projections 4c is to control the site of the depression of the hollow member 1 (see column 5, line 65 to column 6, line 54).

For at least the reasons given above, the Applicants respectfully request the rejection of claim 5 under 35 U.S.C. § 102(b) as being anticipated by Taga be withdrawn.

Claim Rejections - 35 USC §103(a)

Claims 10, 11, 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taga (U.S. Patent No. 5,964,580 A) in view of Kitsnik (U.S. Patent No. 4,439,112 A). The Applicants respectfully traverse.

The Applicants submit that the combination of Kitsnik and Taga is improper. In Kitsnik, two tubular diaphragm pumps 4 and 5 are depicted which are open at each opposing end. Kitsnik does not disclose the pump having an open end and a closed end as required by claim 1 to which claims 10,11, 12, and 14 depend. Accordingly, because Kitsnik does not disclose a monitor for monitoring the condition of a closed end, it is not readily apparent how Kitsnik can be applied or combined with Taga to anticipate the invention of claims 10, 11, 12, and 14.

Even if the combination were proper (which is not admitted), the Applicants submit Kitsnik fails to at least disclose: 1) "tube structure being maintained in a taut condition between the ends thereof"; and 2) "...the pumping chamber being configured to receive pumped fluid ***to cause the tube structure to move towards the expanded condition***...," as recited in claim 1. As argued above, neither of the above features are disclosed by Taga, therefore, even if combined with Kitsnik, the combination would not render the above features obvious. Accordingly, claims 10, 11, 12 and 14 are nonobvious at least by virtue of their dependency on claim 1.

For at least the reasons given above, the Applicants respectfully request the rejection of claims 10,11,12, and 14 under 35 U.S.C. § 103 as being obvious over Taga in view of Kitsnik be withdrawn.

Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caillaud (U.S. Patent No. 2,971,465 A) in view of Eull. The Applicants respectfully traverse.

Eull discloses a tubular diaphragm pump having a tubular diaphragm 15 connected at one end to a head section 26 and at an opposite end to a foot section 27. Eull does not disclose "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1. Therefore, Eull cannot be relied on for rendering the above feature obvious. As argued above, Caillaud likewise fails to disclose the above feature. Accordingly, the Applicants submit that, even if combined, the combination of Caillaud and Eull would not render "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1, obvious. Therefore, the Applicants submit claims 10 and 13, which depend from claim 1, are nonobvious at least by virtue of their dependency upon a nonobvious base claim (claim 1).

For at least the reasons given above, the Applicants respectfully request the rejection of claims 10 and 13 under 35 U.S.C. § 103 as being obvious over Caillaud in view of Eull be withdrawn.

Claims 15-20, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caillaud (U.S. Patent No. 2,971,465 A) and in view of Voelker (U.S. Patent No. 3,250,226 A). The Applicants respectfully traverse.

Voelker discloses a hydraulic actuated pumping system having two collapsible tubes 16 and 18 housed in respective hydraulic chambers 12 and 14. Voelker discloses that hydraulic fluid is sequentially pumped into and evacuated from the chambers 12 and 14 under the control of a timer 74 to cyclically expand and collapse the tubes 16 and 18 to deliver a substantially constant flow of fluid. However, Voelker does not disclose that tubes 16 and 18 are maintained in a taut condition, nor is such a condition obvious in light of Voelker's disclosure. As discussed above, Caillaud also fails to disclose such a feature. Therefore, even if combined, the combination of Caillaud and Voelker would not render "...tube structure being maintained in a taut condition between the ends thereof...," as recited in claim 1, obvious. Accordingly, the Applicants submit claims 15-20, 23 and 24 are nonobvious at least by virtue of their dependency on claim 1.

Additionally, the Applicants note that Voelker also fails to disclose that the tubes 16 and 18 are movably supported. Furthermore, the Applicants submit such a feature is not obvious in light of Voelker's disclosure. As argued above, Caulliad likewise fails to disclose the above feature. Therefore, even if combined, the combination of Voelker and Caillaud would not render "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1, obvious. Accordingly, the Applicants submit claims 15-20, 23 and 24 are nonobvious at least by virtue of their dependency on claim 1.

For at least the reasons given above, the Applicants respectfully request the rejection of claims 15-20, 23, and 24 under 35 U.S.C. § 102(b) as being obvious over Caillaud in view of Voelker be withdrawn.

Claims 17, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Caillaud (U.S. Patent No. 2,971,465 A) in view of Voelker (U.S. Patent No. 3,250,226 A) and further in view of Taga (U.S. Patent No. 5,964,580 A). The Applicants respectfully traverse.

As argued above, neither Voelker, nor Caillaud, nor Taga, alone or in combination, teach or suggest a "tube structure being maintained in a taut condition between the ends thereof," as recited in claim 1. Accordingly, even if the references were combined, the combination would not render the above feature obvious. The Applicants submit, therefore, that claims 17, 21 and 22 are nonobvious at least by virtue of their dependence upon claim 1.

For at least the reasons given above, the Applicants respectfully request the rejection of claims 17, 21 and 22, and all claims which depend thereon, under 35 U.S.C. § 103 as being obvious over Caillaud in view of Voelker and further in view of Taga be withdrawn.

Claims 1, 15, 25, 26, 28-32, 36-39 and 41-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voelker (U.S. Patent No. 3,250,226 A) and in view of Caillaud (U.S. Patent No. 2,971,465 A).

As argued above, neither Voelker nor Caillaud, alone or in combination, teach or suggest a "tube structure being maintained in a taut condition between the ends thereof," as recited in claim 1. Accordingly, even if the references were combined, the

combination would not render the above feature recited in claim 1 obvious. The Applicants further submit that claims 15, 25, 26, 28-32, 36-39 are nonobvious at least by virtue of their dependency on claim 1.

For at least the reasons given above, the Applicants respectfully request the rejection of claims 1, 15, 25, 26, 28-32, 36-39, and all claims which depend thereon, under 35 U.S.C. § 103 as being obvious over Voelker and in view of Caillaud be withdrawn.

For similar reasons given above, the Applicants respectfully request the rejection of claims 41-43 under 35 U.S.C. § 103 as being obvious over Voelker and in view of Caillaud be withdrawn.

Claims 27 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Voelker (U.S. Patent No. 3,250,226 A) in view of Caillaud (U.S. Patent No. 2,971,465 A) and further in view of Kahr et al. (U.S. Patent No. 2,027,104 A).

Kahr does not disclose a pump or device comprising a flexible and substantial inner elastic tubular structure being movably supported, accordingly, Kahr cannot be relied on for rendering "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1, obvious. As argued above, neither Voelker nor Caillaud disclose the above feature. Accordingly, because neither Voelker nor Kahr disclose "the tube structure is movably supported to accommodate longitudinal extension and contraction of the tube structure," as recited in claim 1, then the combination cannot render the above feature obvious. Claims 27 and 40, therefore, are nonobvious over the combination of Voelker, Caillaud, and Kahr at least by virtue of its dependency on claim 1.

For at least the reasons given above, the Applicants respectfully request the rejection of claims 27 and 40 under 35 U.S.C. § 103 as being obvious over Voelker in view of Caillaud in further view of Kahr be withdrawn.

CONCLUSION

Accordingly, in view of the above amendments and remarks, reconsideration of the objections and rejections and allowance of each of claims 1, 3, 5-36, and 39-43 in connection with the present application is earnestly solicited.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicants hereby petition for a three (3) month extension of time for filing a reply to the outstanding Office Action and submit the required $$1,110.00 extension fee herewith.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gary D. Yacura at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. §1.17; particularly, extension of time fees.

Respectfully submitted,

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